PROTECTING DRINKING WATER FROM CONTAMINATION

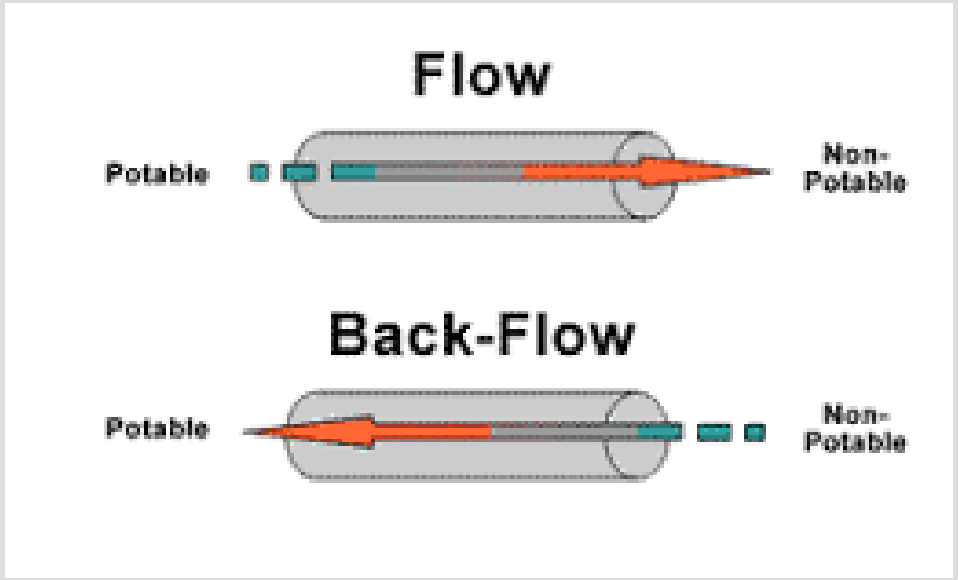
CROSS CONNECTION CONTROL PROGRAM

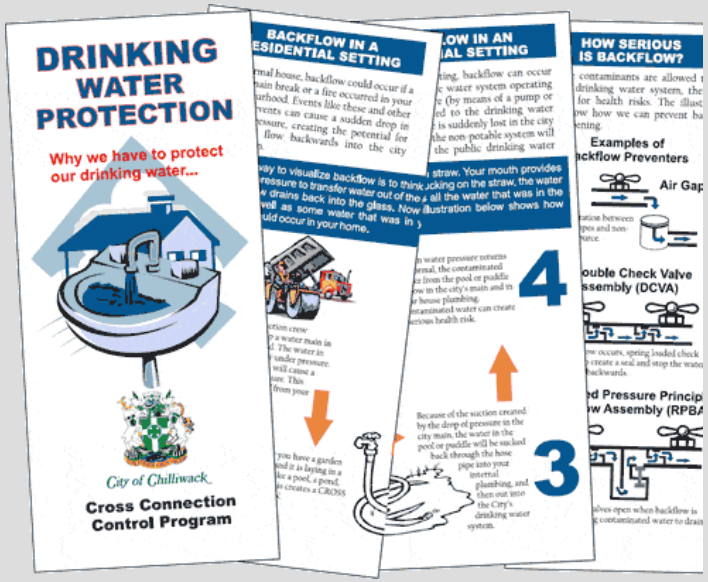
RAJ SAMRA

BCIT

TERRITORY ACKNOWLEDGEMENT

We acknowledge that we are on the traditional and unceded territories of the xʷməθkʷəy̓əm (Musqueam), Sḵwx̱wú7mesh (Squamish) and səlilwətaɬ (Tsleil-Waututh) Nations.





INTRODUCTION TO CROSS CONNECTION CONTROL

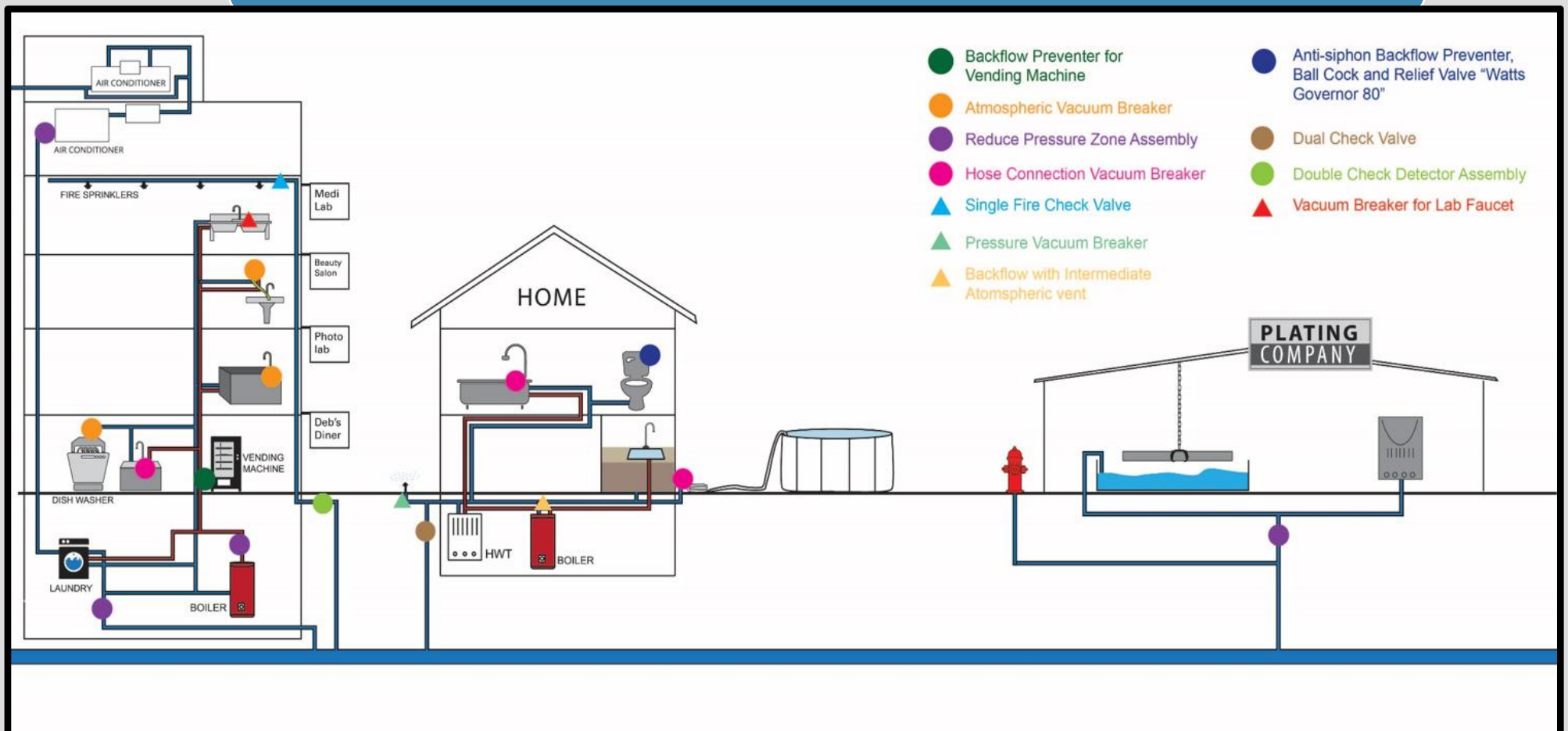
What are Cross Connections?

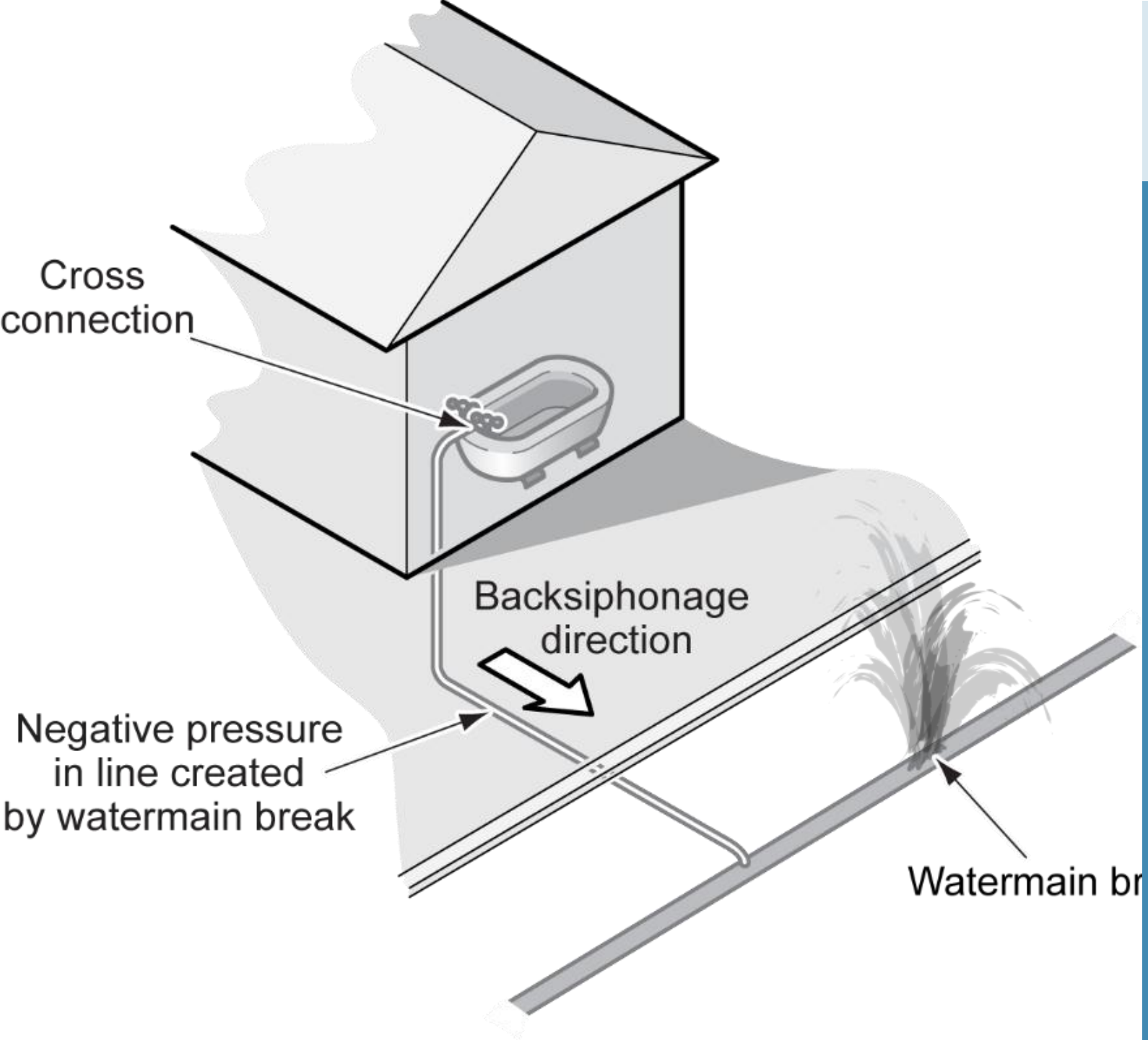
A cross connection is any actual or potential physical connection between a potable water line and any pipe, vessel or machine containing a non-potable fluid or has the possibility of containing a non-potable fluid, such that it is possible for the non-potable fluid to enter the water system by **backflow**

Backflow

Backflow is the undesirable reversal of flow in a potable water system. When this occurs, other liquids, mixtures, gases, or substances can enter the potable water piping through a cross connection.

Under the right hydraulic conditions, backflow can result in contamination of the water supply when a cross connection exists. These hydraulic conditions are called **backpressure** and **backsiphonage**



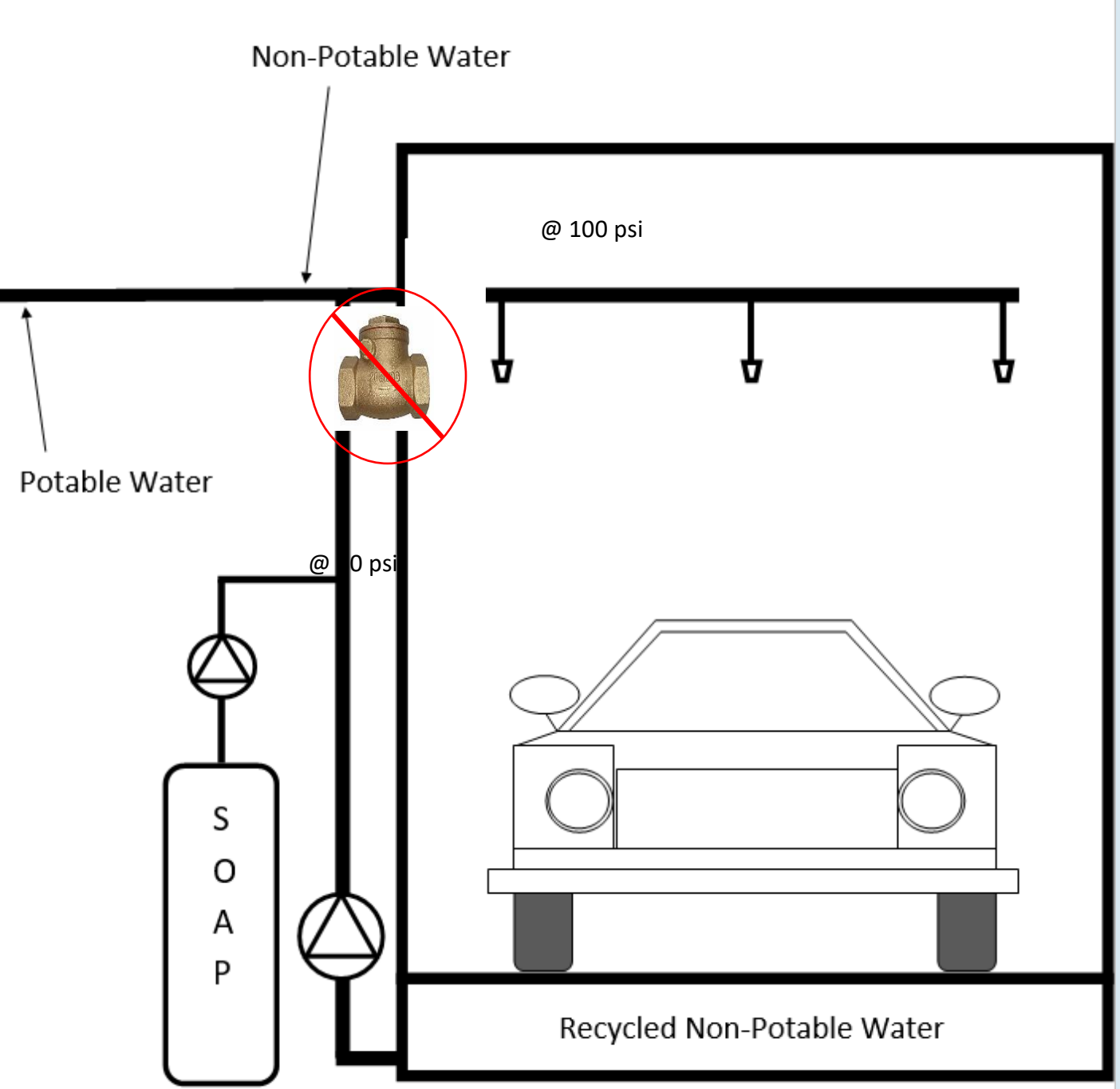


WHAT CAUSES BACKSIPHONAGE?

Backflow can be caused by "backsiphonage".

This happens when there is a reduced or negative pressure in the potable water supply piping. A vacuum is created which draws water from any source back into the water supply (pipe).

Backsiphonage is the most common type of backflow and virtually every potable water system is subject to backsiphonage.



What Causes Backpressure?

Backflow can be caused by “Backpressure”. This happens when there is elevated or higher pressure in the customer’s or user’s potable water supply piping.

Water naturally flows from higher pressure to lower pressure, therefore, the water, from the customers piping will force it’s way back into the public potable supply piping.

Backpressure is possible when booster pumps or boilers are used or can occur with elevated piping.

MULTI-BARRIER APPROACH

Determining Risk Factors: Hazard Classifications

Severe Hazard

- Any type of cross connection or potential cross connection involving water that has additives or substances that, under any concentration, can create a danger to health

Moderate Hazard

- Any minor hazard cross connection that has a low probability of becoming a severe hazard.

Minor Hazard

- Any existing connection, or a potential connection between the domestic water pipe and any pipe, vat or tank intended for carrying or holding potable water, which has a low probability of becoming a moderate hazard

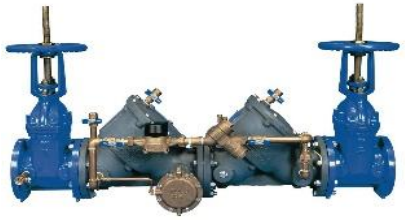
BACKFLOW PREVENTION METHODS AND BACKFLOW PREVENTERS

- Non-Mechanical Backflow Prevention
- Testable Backflow Preventers
- Non-Testable Backflow Preventers
- Water Use Equipment With Built In Backflow Protection

TESTABLE BACKFLOW ASSEMBLIES

Reduced Pressure Backflow Assembly (RP)

Double Check Detector Assembly (DCDA)

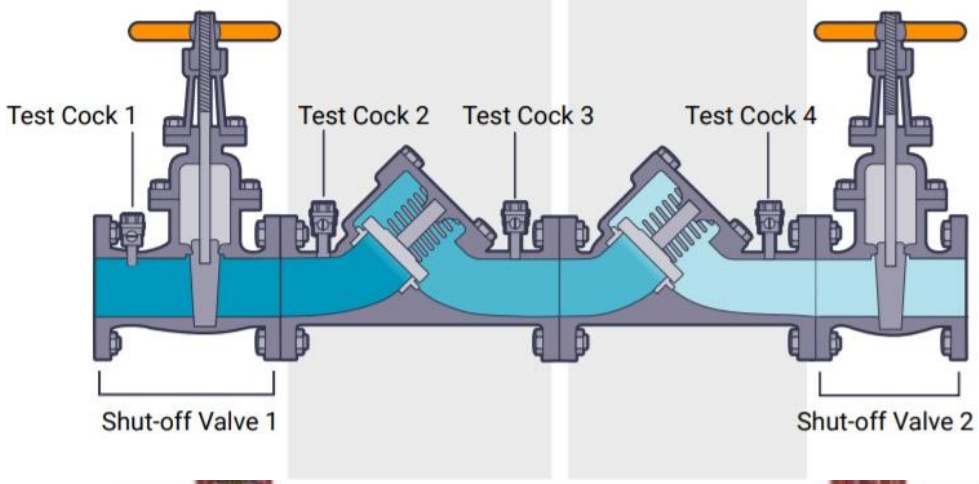


Reduced Pressure Detector Assembly (RPD)

Pressure Vacuum Breaker (PVB)

Double Check Valve Assembly (DCVA)

Spill Resistant Pressure Vacuum Breaker (SRPVB)



DOUBLE CHECK VALVE ASSEMBLY (DCVA)
DOUBLE CHECK DETECTOR ASSEMBLY (DCDA)

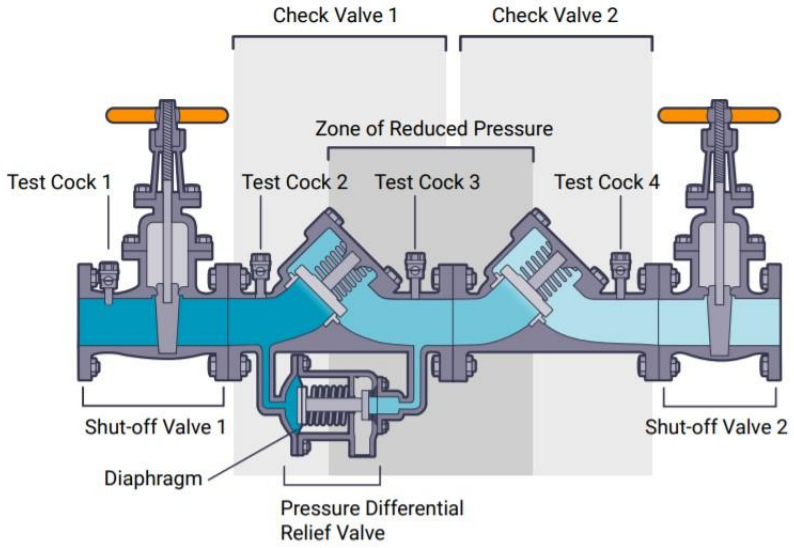
Approved up to Moderate Hazard

DCVA consists of two independently acting. Internally loaded check valves installed as a unit between two tightly closed shut off valves, with four properly located test ports

Effective for Backsiphonage and Backpressure

Double Check Detector Assemblies (DCDA) is a hybrid version of a DCVA consisting of the mainline backflow preventer and a factory installed bypass with a water meter and bypass backflow preventer

REDUCED PRESSURE PRINCIPLE BACKFLOW ASSEMBLY (RP)
REDUCED PRESSURE PRINCIPLE DETECTOR ASSEMBLY (RPD)



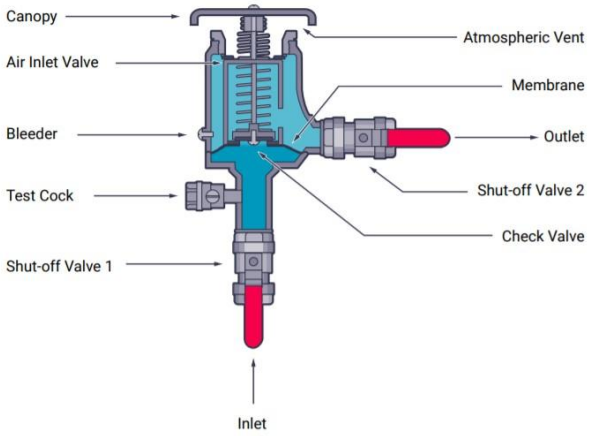
Approved up to Severe Hazard

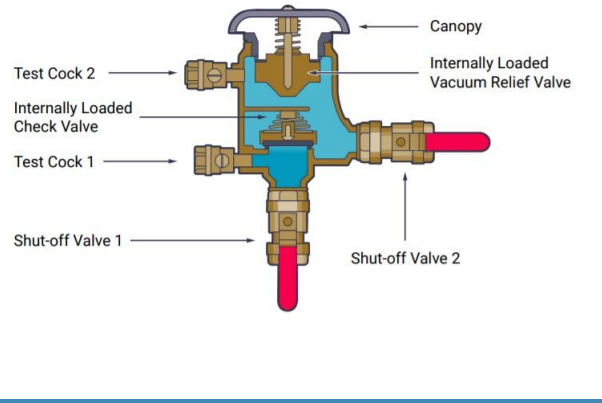
The Reduced Pressure Principle Backflow preventer (RP) consists of two independently acting, internally loaded check valves separated by a reduced pressure zone protected by a differential relief valve. The backflow preventer is installed as a unit between to drip tight shut off valves with four properly located test ports.

Effective for both Backsiphonage and Backpressure

Reduced Pressure Principle Detector Assembly (RPD) is a hybrid version of a RP consisting of the mainline backflow preventer and a factory installed bypass with a water meter and bypass backflow preventer

PRESSURE VACUUM BREAKER (PVB)
SPILL RESISTANT PRESSURE VACUUM BREAKER (SRPVB)





- Approved up to Severe Hazard
- The Pressure Vacuum Breaker (PVB) consists of one internally loaded check valve, an internally loaded relief valve (normally open), inlet and outlet shout off valves and two properly located test ports
- The Spill Resistant Type Pressure Vacuum Breaker (SRPVB) is similar to a PVB with the exception of an additional internal spill resistant membrane. The check valve is forced loaded to the closed position , while the vent port valve is float operated and in the open position
- Backsiphonage only
- Must be installed in the vertical position at a minimum of 12” (300mm) above the highest fixture flood level rim or the highest point in the downstream piping

AVB

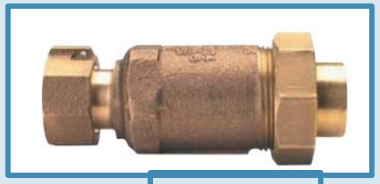
ASVB

HCVB

HCDVB

DuCV

LFVB



DuC

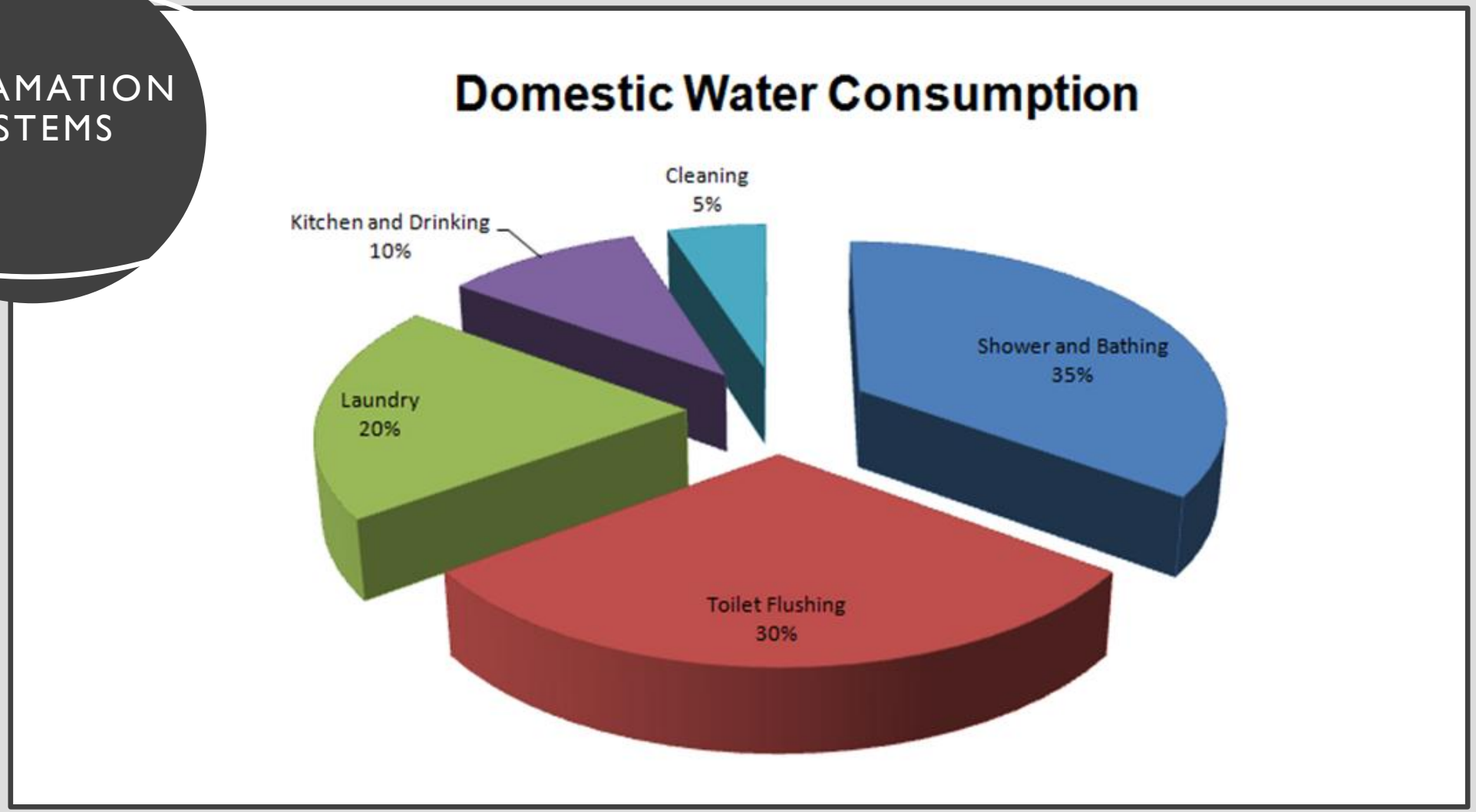
DCAPC

DCAP

Non-Testable Backflow Devices

- Non-Testable vacuum breakers and backflow prevention devices have no test ports, test procedures nor requirements for performance tests
- Used as the sole backflow preventer these devices can only be used under Minor Hazard conditions
- Non-Testable backflow preventers can be used in higher levels of hazards if installed in conjunction with DCVA's, PVB's, RP's and AG's
- Non-Testable Vacuum Breakers:
  - Cannot be subjected to Backpressure
  - Cannot be subjected to continuous water pressure for a prolonged time
  - Cannot have a valve or fixture that closes downstream of the backflow preventer

RECLAMATION SYSTEMS

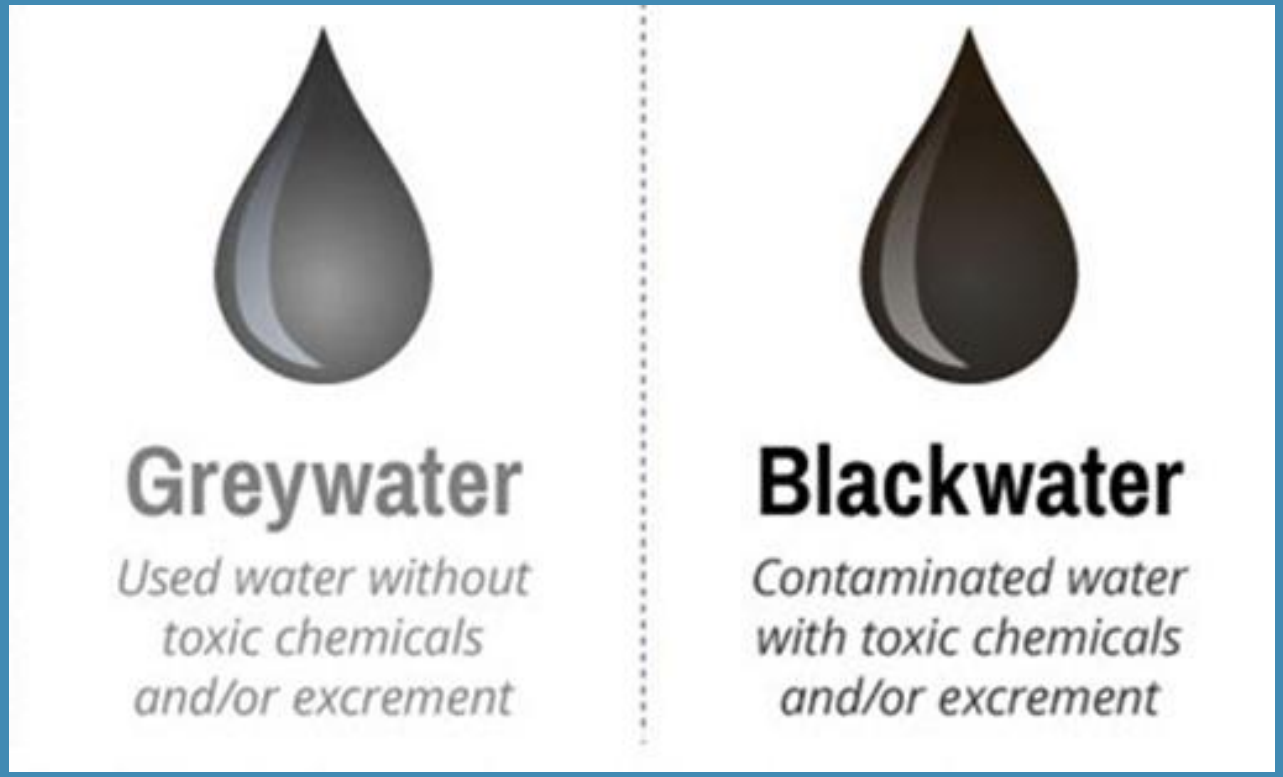


Greywater is wastewater from:

- Lavatories
- Bathtubs and Showers
- Laundry machines
- Tubs

Greywater

- Fewer pathogens
- Decomposes quickly
- 60%-65% of household wastewater



Blackwater is wastewater from:

- Water Closets (Toilets)
- Human feces and urine
- Kitchen Sinks and Dishwashers
- Cooking fats and oils
- Food particles

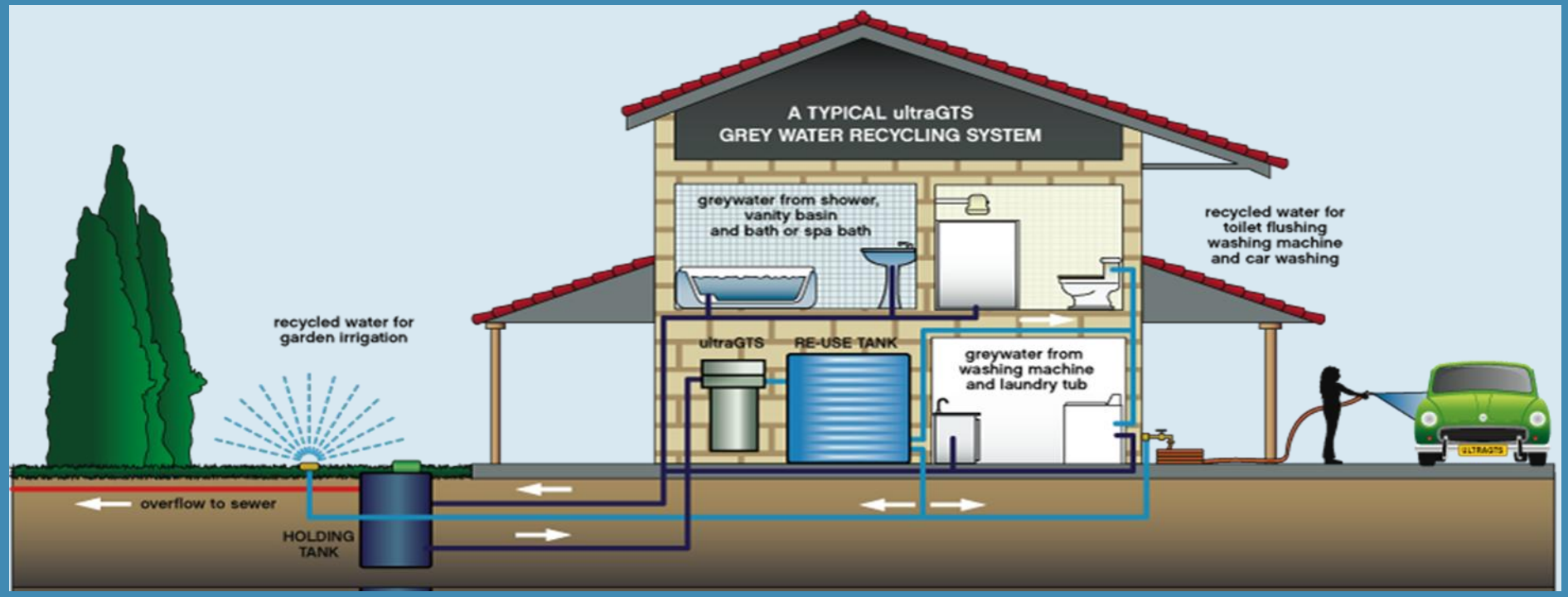
Blackwater

- Human waste/ pathogens
- Decomposes slowly
- Contamination concerns

DOMESTIC WATER CONSUMPTION

Greywater Treatment Systems collect and treat the greywater to a higher quality. The quality of the treated water allows the water to be used to flush toilets and urinals, act as a cold-water supply, and above grade irrigation.

GREYWATER RECLAMATION



Reduced Pressure Backflow Assembly (RP)

Reduced Pressure Detector Assembly (RPD)

Double Check Valve Assembly (DCVA)

Double Check Detector Assembly (DCDA)

Pressure Vacuum Breaker (PVB)

Spill Resistant Pressure Vacuum Breaker (SRPVB)

NOTHING WITHOUT CROSS CONNECTION CONTROL

**SAFE WATER AND WATER SUSTAINABILITY*

Cross Connection is any actual or potential connection between a potable water supply and any pipe, vessel, tank, plumbing fixture, equipment or device through which it is possible for used, polluted or contaminated water or any other substance to enter the potable water system.

QUESTIONS?